Statement of Purpose

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Affordable and reliable Internet access has been a problem that persists in the developing nations. Growing up in one of the developing countries, Indonesia, I have experienced the impact of this problem first hand. For instance, countless deaths resulted from the Tsunami that struck one of the islands in Indonesia back in 2004. Having university lecturers in the Electrical Engineering and Computer Science (EECS) department as both of my parents, I have been exposed to computers and programming early in my life. I quickly realized the potential of computers in helping to eradicate such problems that exist in Indonesia. In the aforementioned problem, had there been a properly established networking infrastructure, an early warning system could be designed and the casualties could be eluded. My desire to improve the living conditions in my home country has served as a reason that sparks my interest in research.

After surveying several areas of computer science, I believe that the area of operating systems and computer networking is the best match for my interest. For the past two years, I have been conducting research with Professor John Kubiatowicz and the Par Lab operating systems group. Specifically, I help design and implement Tessellation, our manycore OS. Experiencing a large-scale systems project, from the early conceptual design stages through implementation and evaluation, has been extremely fruitful, my experiences with the Par Lab have helped in refining my research interests while preparing me for future systems research.

My work in Tessellation began with designing and implementing its Quality of Service (QoS) guarantees in Linux. We needed to implement our own lock-free shared-memory buffer for efficient communications between processes. The framework used for composing the GUI applications that we were targeting is Qt and thus, we modified its internals to encompass the same model as Tessellation. In the end, we were able to earn a 7x speedup in our version of Qt compared to the unmodified Qt. The drastic increase in performance that we achieved is very encouraging since we managed to exercise our engineering skills in a commercial program used by thousands of people. Moreover, the interest expressed by companies such as Nokia when our work is presented at the ParLab 2010 winter retreat [1] has further confirmed our success.

Following that, I was working to complete the existing work in porting Advanced Configuration and Power Interface (ACPI) to Tessellation, collaborating with a post-doctoral researcher from NEC. Understanding the Intel manuals is a challenge in itself since since there are hardly any tutorials online. However, by the end of the summer, I'm able to navigate my way through the manuals and even managed to get ACPI running smoothly in Tessellation. When I was porting ACPI, I also restructured how PCI devices are being discovered and added support for PCI-express devices in Tessellation. As our paper deadline is approaching, my focus shifted to implementing and automating the process of running the experiments followed by parsing the results and constructing the graph. My contribution to the project has resulted in a poster presented at HotChips 2011 [3] and two publications submitted to EuroSys and CATA 2012 [2, 4] which are currently in-review.

Additionally, I believe that teaching is an integral part of conducting research. A discovery is

far from complete if one does not also find a way to present and elucidate it to others. Even more importantly, organizing a vast array of result for presentation is a crucial skill that a researcher must share with a teacher. I have been involved with education throughout my undergraduate years in which I have served as a tutor in the community college and as a teaching assistant for upper division operating systems class in Berkeley.

In graduate school, I would like to explore ways to improve the reliability and energy-efficiency of networking infrastructures. University of Washington stands out due to the number of world-renowned faculties in the area of systems and networking that I would like to work with such as Professor David Wetherall and Professor Tom Anderson. I am also attracted by the strength of the undergraduate program in University of Washington as I look forward to becoming a teaching assistant again as a graduate student. For these reasons, I believe that the PhD program at University of Washington is the best match for my interest. My long term goal is to remain in the academia as a professor, contributing to the research community, undergraduate education and most importantly, the society as a whole. Given my background, I believe that I am in a good position to make crucial contribution in such pursuits.

References

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